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CASCARA

Introduction

Numerous inquiries about Cascara buckthorn (Rhamnus purshiana De Candolle) are received each year by the School of Forestry at Oregon State College. This paper seeks to give a condensed statement of the history of the Cascara, its use as a medicinal preparation, its silviculture, its value, a description of the tree, factors in the artificial regeneration of the tree, and other pertinent information which should serve to meet these inquiries.

In the main, the information expressed in the paper is a condensation of a bulletin by this same name by T. J. Starker of Oregon State College, and A. R. Wilcox, Forest Examiner, U.S.F.S., but the writer found much useful information in a thesis on Cascara written by Marvin Helland, 1941, Oregon State College, in Bulletin No. 108 by the Minister of Agriculture, Province of British Columbia, Victoria, British Columbia and in other sources.

History of the Cascara Tree

Cascara, as this tree is commonly called, was first noted near the banks of a tributary to the Columbia River about 1805 by members of the Lewis and Clark expedition. Eschscholtz, a Russian naturalist, noted it in California in 1816, and early priests of Mexican and Spanish settlements in old California were supposed to have known this species since early 1800.

The tree was first called Rhamnus cathartica in about 1820, but in 1890 the name of Rhamnus purshiana was officially adopted, commemorating the botanical labors of Frederick Pursh, who first described the tree. This name is accepted by the botanical and scientific world, while Cascara sagrada is the name adopted by the materia medica.

The tree belongs to the genus Rhamnus, of the Rhamnaceae or buckthorn family, of which several species exist, widely distributed on four continents. It has many common names, among which the following are noted by Sudworth: Shittim Wood, cascara sagrada, bearberry, bearwood, wahoo, chittim, cascara buckthorn, yellow wood, coffee berry, Oregon bearwood, and others. Cascara buckthorn is the name adopted by the U. S. Forest Service in 1940.

Distribution

Cascara is found widely distributed from southwestern British Columbia southward to central California, extending along mountain ranges of northern Washington, to the Bitter Roots of Idaho, and occurring occasionally on eastern slopes of the Sierra Nevada mountains. It reappears on the mountains of Colorado and western Texas.

The commercial range of the tree is confined to northwest California, western Oregon and Washington, and southern British Columbia. The most important part of the range is western Oregon and Washington, but British Columbia produces fair quantities of bark.

Medicinal Value - Importance of the Tree

The commercial importance of Cascara is based upon the medicinal properties of its bark, the extract of which is widely used as a laxative or cathartic. The medicinal property of the bark, which has never been isolated, increases the secretion of the intestinal canal and at the same time acts as a tonic. This tonic quality tends to prevent the constipation which usually follows the use of similar drugs, and thus allows a gradual decrease in dose until none is needed.

In use a certain quantity of powdered dried bark is made into a solution with various other medicines or drugs. The bark of several other species of this genus has been used as a laxative since an early date, so it is not surprising that the bark of Rhamnus purshiana has been found to be valuable for this purpose.

Description of the Tree

Size: Cascara has been recorded as reaching a height of 60 feet, and a diameter of 2½ to 3 feet, but is usually 20 to 40 feet in height and 6 to 15 inches in diameter in its commercial range.

Age: The longevity of this tree has not been completely determined, but four trees growing on the Smith River in southwestern Oregon, ranging in diameter from 10 to 16 inches, were from 57 to 65 years old. A tree 79 years of age has been reported on the Suislaw National Forest. Peeling of the bark has killed most mature trees, so figures on the size to which the tree might grow are lacking.

Leaves: The tree is deciduous save for seedlings. The leaves are arranged alternately on the stems, and are broadly elliptical, obtuse or blunt-pointed at the apex, rounded at the base, and finely serrate on the edges. They have prominent veins, and are 1½ to 7 inches long and 1½ to 2 inches wide.

Flowers: The flowers, appearing in May or June, are small, five petaled, greenish, and are borne in clusters near the ends of the branches.

Fruit: The fruit, which matures in one season, is round, 1/3 to 1/2 inch in diameter, smooth and black when ripe, red when immature. It has 2 to 3 hard, smooth, olive green seeds enclosed in a juicy, rather thin pulp, and is relished by birds and mammals. It is thought that cascara begins to produce seed at 5 to 7 years of age.

Buds: The buds of cascara offer a very sure means of identification in winter, since it is the only known deciduous tree on the Pacific Coast which has buds not covered by bud scales.

Bark: The bark of the Cascara tree varies from 1/10 to 2/10 inch in thickness and rarely reaches 1/4 inch. Its color ranges from dark to light brown or gray, tinged with red. The inner surface is bright yellow when freshly exposed, but darkens on exposure. It has a bitter taste and colors the saliva yellow.

Wood: The wood of this tree is moderately heavy, having a specific gravity of 0.5836, weighing 36.37 pounds per cubic foot according to Sargent. It is ring porous with diffuse porous tendencies, firm but brittle, brown tinged with red, with lighter sapwood. It is of little economic value, being used only for posts, cheap furniture and spokes. Tests indicate a short life for this species when used as a post.

The wood also contains the medicinal property found in the bark, but in smaller quantities. Twigs less than 1/4 inch in diameter have 50 per cent of the medicinal value of the bark, while twigs 1 inch and less have about 30 per cent of the medicinal value of the bark.

Roots: Cascara has a rather shallow root system, with no tap root except in a very porous, well-drained soil. Seedlings have a fibrous root system which makes transplanting easy.

Form: The form of the tree varies with the condition under which it is grown. Open grown trees have a short trunk with a thick brushy crown, while forest grown trees have a long, slender bole, clear for 15 to 20 feet, and have a much less dense crown.

When cultivated in plantations and pruned, the tree produces a bole clear for about 1/3 its total height and develops a main stem which maintains its size well.

Silvics of Cascara

Soil and Moisture:

Cascara is rather exacting in its soil and moisture requirements, growing best in deep, rich, clayey, sandy, rocky, or humus soils in low river bottoms, flats, valleys, and borders of streams. It seems to grow best on clay loam and must have moist but well-drained soils. The soil and moisture requirements of cascara are similar to those of Oregon ash, red alder, aspen, and Douglas-fir.

Light Requirement:

This tree is exceedingly tolerant of shade in humid air and moist soils,

factors of assistance in commercial plantings where it is grown in close stands. It does best in close stands with side shade but plenty of overhead light.

Dangers to which Cascara is Subject:

Rhamnus purshiana is quite hardy, being relatively free from insect pests and fungus disease. A few saphrophytes grow on dead parts of trunks and branches but no parasitic fungi have been noted.

Flat-headed borers, aphis, a small leaf miner, a type of scale, and certain moths have been noted attacking cascara, but not seriously.

Cascara is shallow rooted and thin barked, which makes it quite susceptible to fire damage. Its foliage is relished by livestock, particularly cattle, so that few seedlings reach maturity in pastured areas.

In commercial plantations, residual trees are severely damaged by sunscald when the stand is opened. This damage results when trees not accustomed to direct sunlight are suddenly exposed to the sun.

Growth:

When cut in early summer, Cascara produces numerous sprouts during the growing season. If thinned and cared for properly, such sprouts will do well, for growth is faster than in seedlings. Figures on coppice sprouts show an average yearly height growth of about 2½ feet up to 10 years of age. The rate of such growth depends upon (1) season when peeled (2) condition and age of stumps (3) light conditions and (4) number of sprouts per stump.

Seedling growth averages about 6 to 18 inches in height at the end of the first year. Seedlings have a shallow root system and can be transplanted easily. When not too crowded or shaded out, they will reach a height of 10 to 12 feet in six year

Collecting and Curing the Bark

The collecting season for cascara bark begins about the middle of April and closes about the end of August. Peeling should be done when the trees are in full leaf at which season the bark slips better. The bark should be peeled in large pieces, and moss and lichens should be scraped off the bark before peeling.

Peeling is usually accomplished by using an axe and a peeling "spud" made from an old file or a leaf from an old car spring. The blade of the spud is slightly curved, and the end has a projection at each side which aids in cutting the bark. The axe is used merely for felling the trees. It is advisable to cut the stump about 6 inches high, leaving it unpeeled and with a smooth sloping surface, which will delay the rotting of the stump and thus aid in coppice production.

Curing is usually done in the open air on a platform or canvas, and in good weather four days will suffice for drying. The practice now is to chip the bark into smaller pieces before drying. Care should be taken not to expose the inside of the bark to the sun, for discoloration results.

The bark must be aged for from 1 to 2 years before being used for medicinal purposes. Usually the collector sells the dried bark and does not concern himself with the aging process.

Pounds of Dry Bark per Tree

Open grown trees do not yield as much bark as trees of the same diameter grown in a closer stand. Tables showing the estimated yield of dry bark for trees of a given diameter have been made and show a range from 5 pounds for a 3 inch diameter tree to 175 pounds for a 17 inch tree.

The present standard of utilization shows yields which could probably be increased by 25 per cent with more careful peeling. Green bark on the average loses about 50 per cent of its weight in drying, and bark cut earlier in the season loses a greater percentage than does bark collected later.

Suggested Harvesting Methods

In the past, most peeling has given little consideration to conservation of the supply of Cascara. Recently, the British Columbia government set forth the following steps in harvesting Cascara bark in an attempt to prevent waste:

1. Take bark only from trees 5 inches in diameter and over.

2. Cut each tree down clean, leaving an unpeeled stump not over 1 foot in height.

3. Do not expose the inner surface of the bark to the sun when curing it.

4. When dry, the bark may be broken into smaller pieces to facilitate packing.

It has been suggested that trees be peeled so that vertical strips of bark may be left on the stem to heal over and produce new bark. This practice seems to weaken the tree, and is not practical.

The U. S. Forest Service has suggested that when seedlings are planted, all lateral buds save four at the top be removed. These will develop into four main branches and the largest of these may be cut when sufficient size has been reached. The others will continue to grow and a new branch will develop in the place of the old one so that each year or so a harvest of bark may be collected.

One grower has harvested a crop of prunings yearly since the fourth year after planting and has saved all the prunings. These contain a relatively high percentage of the valuable medicinal principle.

Growing Cascara in Plantations

Planting Stock

Planting stock for cascara plantations may be secured in several ways. There are nurseries that grow this species and prices are not excessive. Either government or private nurseries may have stock available for sale.

Seeds may be gathered and planted in seed beds, then moved to transplant beds. Some nurserymen separate the seed from the pulp and stratify it in moist sand over winter. Planting is then done in early spring, February as a rule.

One grower plants the whole berry in the fall and seems to get good results. Under no conditions should the seed be allowed to dry out.

Wild seedlings may be gathered and put in a transplant bed. They develop a well-formed fibrous root system and are well adapted for planting in areas where cultivation is not possible.

Preparation of Planting Site

All competing vegetation should be removed from areas to be planted, and cultivation is advisable if possible. Plowing and harrowing are the usual cultivation procedures practiced before planting.

Planting

One year old planting stock will give good results on moist sites, but two year old transplants should be used on more adverse sites. Transplants are the best stock to use in planting areas where cultivation is impracticable.

Spades, grubbing hoes, or mattocks may be used to plant the young trees. Furrows may be plowed and planting done in these. The same care should be taken as in planting fruit trees. The roots should not be allowed to dry out, and earth should be packed firmly around them. They should be arranged so that they are not twisted or out of shape in the hole. They should be planted the same depth as in the nursery.

Spacing should be such that about 2,000 trees per acre will result. For this purpose, $4\frac{1}{3}$x$4\frac{1}{3}$ ft. spacing will give 2,151 trees per acre, and 4x5 ft. spacing will give 1815 trees per acre. If rows are to be farther apart to facilitate cultivation, trees can be placed closer together in the rows.

Survival is usually high if care is taken in planting--85 to 90 per cent being common.

Care after Planting:

The trees should be cultivated 2 or 3 times a year for the first 3 or 4 years after planting. If the trees are in an area where cultivation is not possible, weeds and other vegetation should be kept cut down for two or three years to allow the cascara to become established. Cover crops, such as clover, may be grown between the rows of cultivated trees to supply nitrogen for the trees.

Expected Returns

The financial returns to be expected from cascara plantations are affected by many factors. One of the most serious hazards to the growing of cascara is

trespass. In times of high price for bark, or in times of unemployment, many people will not hesitate to collect bark from cascara trees wherever found.

Another factor which may affect the industry is the development of other laxative materials, such as mineral oils. So far, cascara has maintained its demand and is said by many authorities to be better than substitutes.

Returns will vary with the quality of the site, the care given the trees, the price received for the bark, the expenses involved in establishing and maintaining the plantation, the amount of trespass suffered, and other factors. No figures are available as to returns from such plantations, but it is believed that the production of cascara on a plantation properly located and tended does offer distinct possibilities.

Notes on the Cascara Industry

The cascara industry has been a source of income to peelers in the Pacific Northwest for many years. The price paid per pound has varied from year to year, as has the amount peeled per year. According to information supplied in February, 1942 by I. P. Callison and Sons of Fort Orchard, Washington, the prices and volumes of cascara over the past ten years have been as follows:

Year	Average Price per Pound	Approximate Volume Peeled
1931	5 ¢	4,500,000 lbs.
1932	4 ¢	4,500,000 lbs.
1933	3½¢	6,500,000 lbs.
1934	4½¢	4,500,000 lbs.
1935	3½¢	3,000,000 lbs.
1936	6½¢	4,500,000 lbs.
1937	7 ¢	6,000,000 lbs.
1938	5 ¢	3,750,000 lbs.
1939	4 ¢	4,500,000 lbs.
1940	6½¢	4,500,000 lbs.
1941	10 ¢	4,500,000 lbs.

The present time, February 1942, the price for cascara bark is 12¢ per pound. What the price will be during the peeling season, no one can say. The war may have a serious effect on prices, as certain foreign markets have been cut off. In 1938, according to figures compiled by the Pacific Northwest Forest Experiment Station,

100 tons of bark were exported to the United Kingdom, 59.5 tons to Australia, and 25 tons to Germany.

The Elliott State Forest, an area of 71,105 acres lying along the coast in northern Coos and western Douglas counties in Oregon, contains the largest block of cascara remaining in the range of the species. The State Board of Forestry in 1937 opened the area to sale of cascara. The successful contractor was compelled to follow certain rules to safeguard the supply for the future. The minimum stump diameter to be cut was set at 4 inches, one foot above the ground.

The total cut in 1937 was about 20 tons taken from approximately a section of land. During 1941, 20,209 pounds were taken from the area, and from the sale $653.49 were added to the irreducible school fund of the state of Oregon. The area is now operated on a continuous productive basis, and the bark will provide annual sums to the school fund. The present contract provides for harvesting 25,000 pounds each year for the next two years.

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